BELLCOMM, INC.
1100 Seventeenth Street, N.W. Washington, D.C. 20036

SUBJECT: Spacecraft Weight Summary for CM-SM/LM-ATM Backup Missions - Case 620

DATE: August 13, 1968

FROM: W. W. Hough

MEMORANDUM FOR FILE

CM-SM and LM-ATM payload weights are needed to calculate propellant requirements and performance margins for any backup mission profile. The basic spacecraft weights used in the ATM backup mission study were derived from the June 15 AAP Weight and Performance Report published by OMSF.

CM-SM

The weights of CM-SM's for 14, 28, and 56 day backup ATM missions without usable SM RCS and SPS propellants were derived using ground rules consistent with the AAP-3 design. These ground rules are that the SM fuel cells will be operated at an average power output of 1.8 KW (the CM-SM power deficit will be supplied by the ATM solar power system), and that the CM-SM will carry the total mission supply of oxygen, hydrogen, nitrogen, and food, but no more lithium hydroxide than the 10 day Apollo supply. The weight of AAP-3 CM-SM without SM propellants is 29,459 pounds. For the 56 day backup mission, the CM-SM weight is 28,234 pounds. The 1225 pound reduction is due to offloading of oxygen and nitrogen required in the baseline mission for OWS-AM-MDA pressurization and leakage makeup, plus a small amount of non-expendable load in the crew systems category. For a 28 day mission under the same ground rules, elimination of consumables for 28-days plus one AAP oxygen tank and one AAP hydrogen tank gives a total CM-SM weight of 26,070 pounds. For a 14 day mission, another set of tanks can be removed and the further consumable weight reduction gives a CM-SM weight without propellants of 24,760 pounds.

LM-ATM

The weight of the baseline LM-A without RCS propellant, plus the ATM is 25,654 pounds. To support a backup mission greater than 10 days in duration, the LM-A must carry LiOH canisters for the CM. The expendable weight for LiOH is 10 pounds per day. Consequently, a LM-A for a 14 day mission must carry 40 pounds of LiOH, a LM-A for a 28 day mission must carry 180 pounds of LiOH, and a LM-A for a 56 day mission must carry 460 pounds of LiOH.

Other Payload Weights

The SLA on the CM-SM launch is part of the payload and weighs 3811 pounds. On the LM-ATM launch, the fixed portion of the SLA weighs 1380 pounds and the launch vehicle mods (primarily the 3 foot spacer) weigh 750 pounds.

1022-WWH-ms

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ABSTRACT

Payload weights for the CM-SM/LM-ATM backup mission have been derived. These weights do not include SM SPS and RCS usable propellants or LM-A RCS usable propellant because these are dependent on the mission profile. The weights given depend only on duration and not on orbital parameters:

	Weight without Propellants	
Duration	CM-SM	LM-ATM
14 days	24760 lbs.	25694 lbs.
28 days	26070 lbs.	25834 lbs.
56 days	28234 lbs.	26114 lbs.
Other Payload (SLA)	3811 lbs.	(SLA) 1380 lbs.
		(LV mods) 750 lbs.